FIG. 1

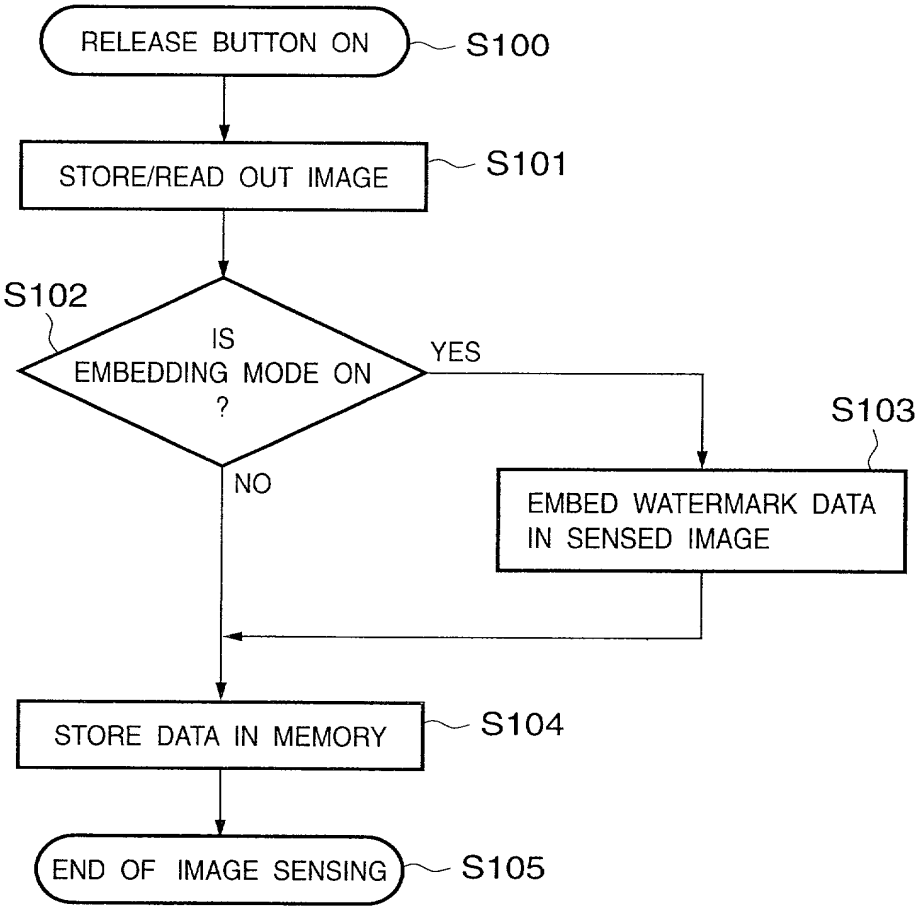

RELEASE BUTTON ON
S100
STORE/READ OUT IMAGE
S101
S102
IS EMBEDDING MODE ON ?
YES
NO
S103
EMBED WATERMARK DATA IN SENSED IMAGE
STORE DATA IN MEMORY
S104
END OF IMAGE SENSING
S105

FIG. 2

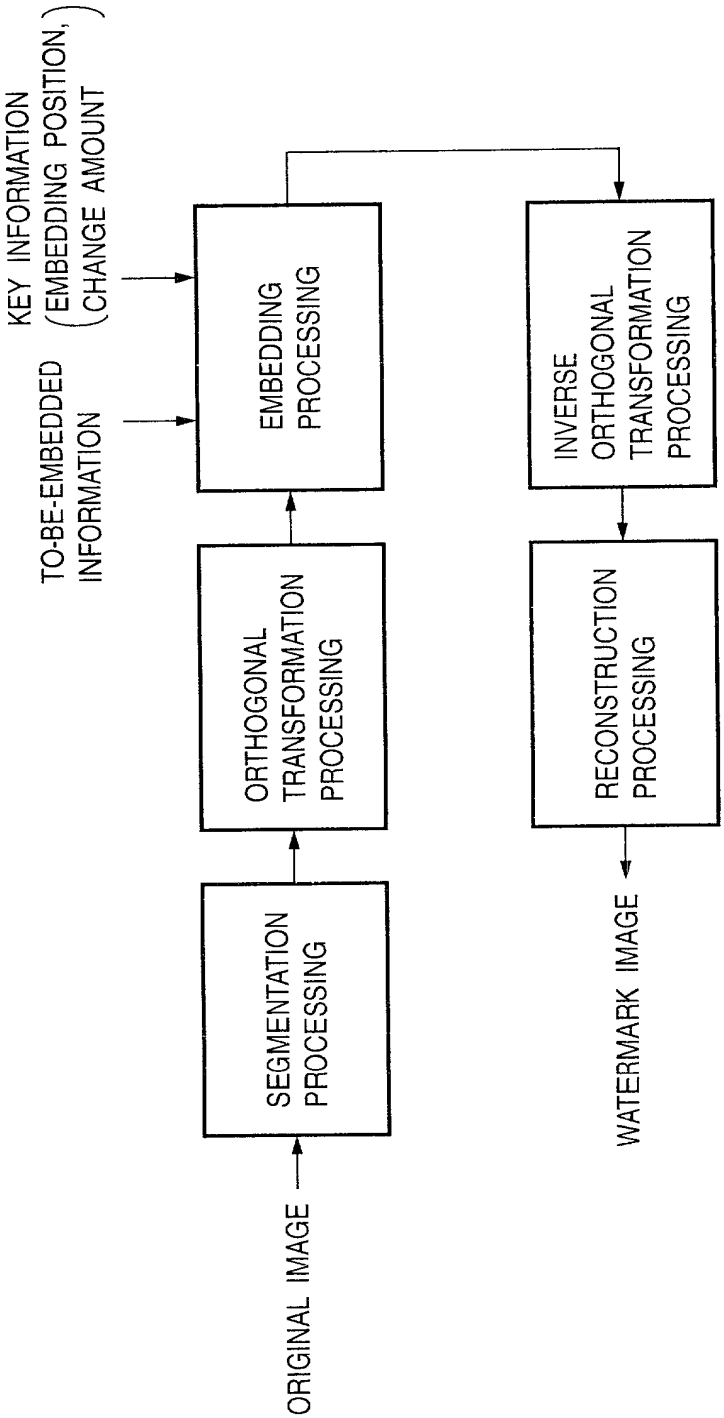

KEY INFORMATION
(EMBEDDING POSITION, CHANGE AMOUNT)
TO-BE-EMBEDDED INFORMATION
EMBEDDING PROCESSING
ORTHOGONAL TRANSFORMATION PROCESSING
SEGMENTATION PROCESSING
ORIGINAL IMAGE
INVERSE ORTHOGONAL TRANSFORMATION PROCESSING
RECONSTRUCTION PROCESSING
WATERMARK IMAGE

FIG. 3

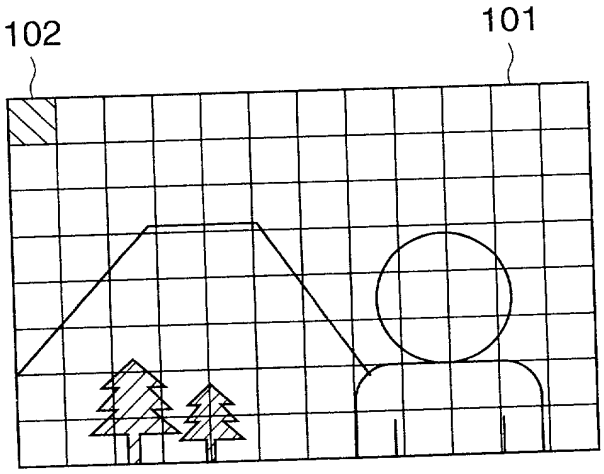


FIG. 4

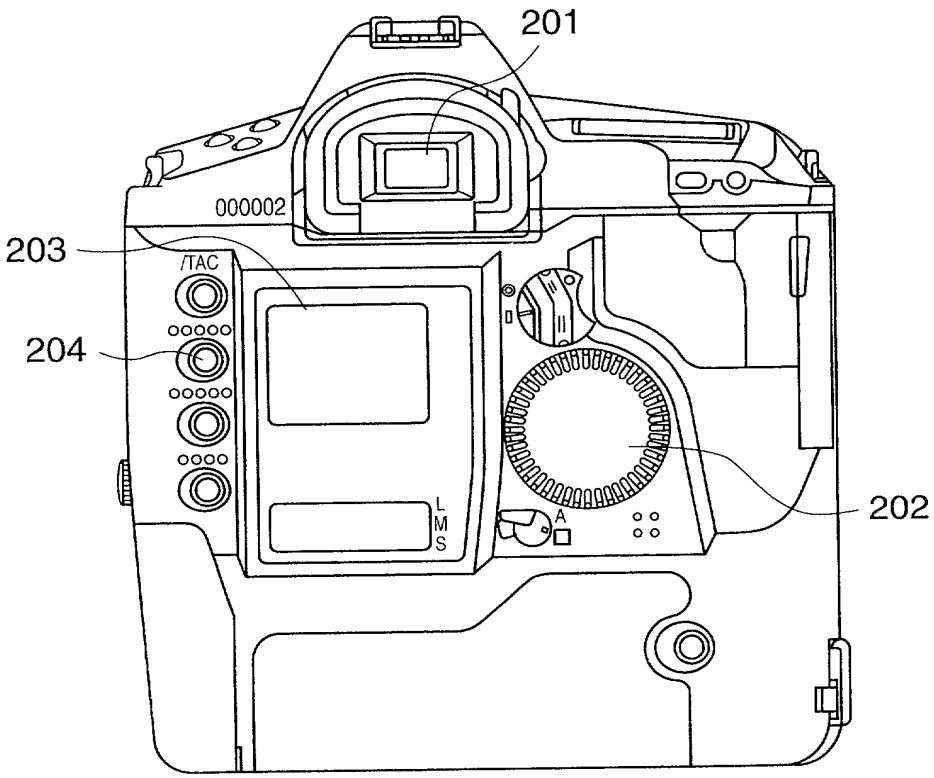


FIG. 5A

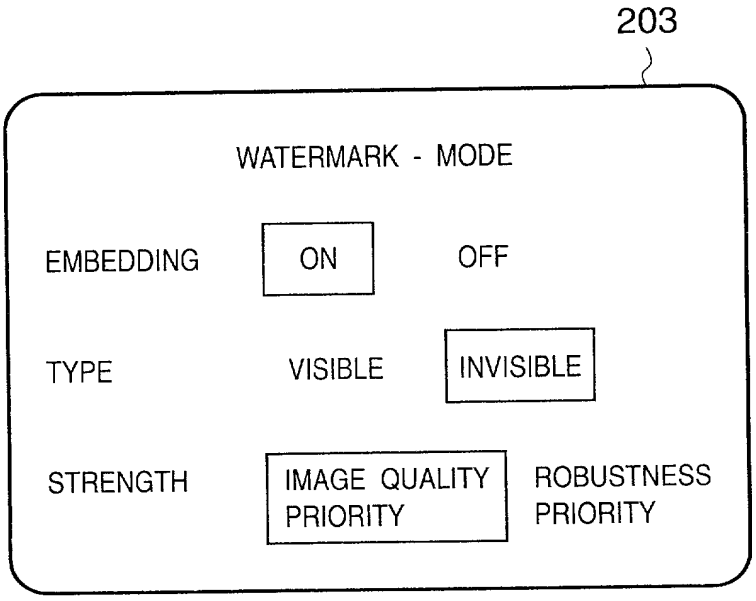

203
WATERMARK - MODE
EMBEDDING
ON
OFF
TYPE
VISIBLE
INVISIBLE
STRENGTH
IMAGE QUALITY PRIORITY
ROBUSTNESS PRIORITY

FIG. 5B

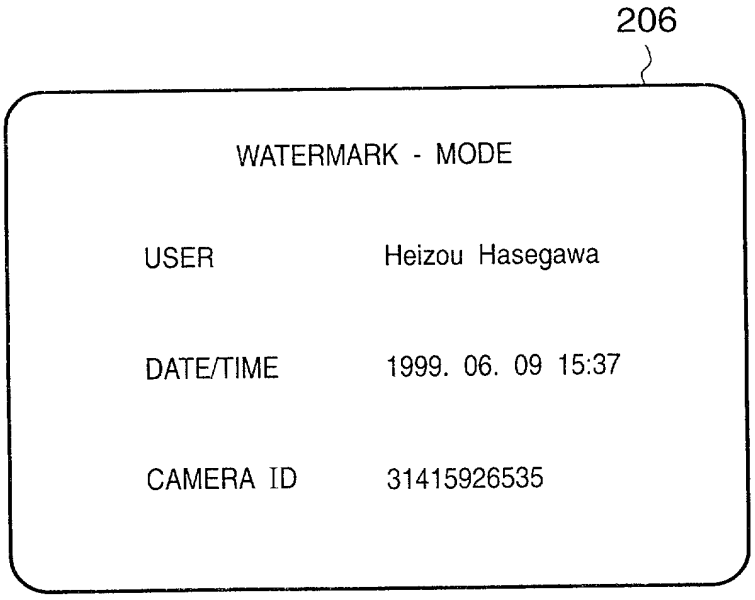
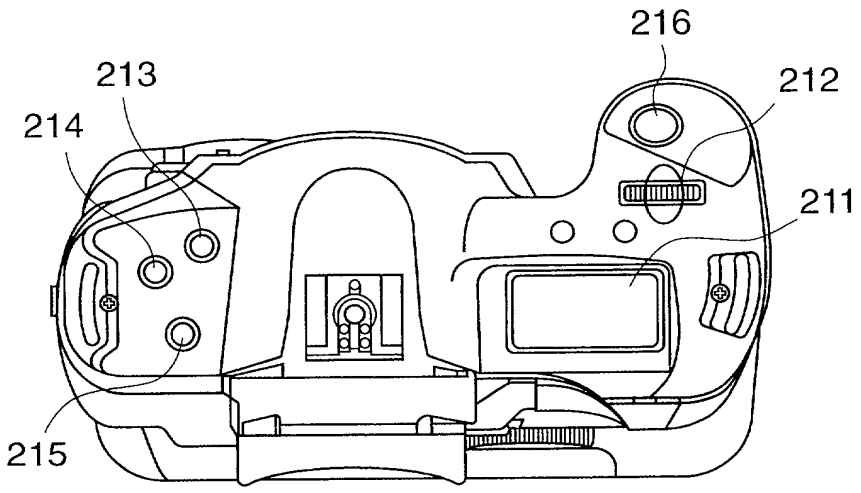

206
WATERMARK - MODE
USER
Heizou Hasegawa
DATE/TIME
1999. 06. 09 15:37
CAMERA ID
31415926535

FIG. 6



EP3 2 715 439 B1

FIG. 7

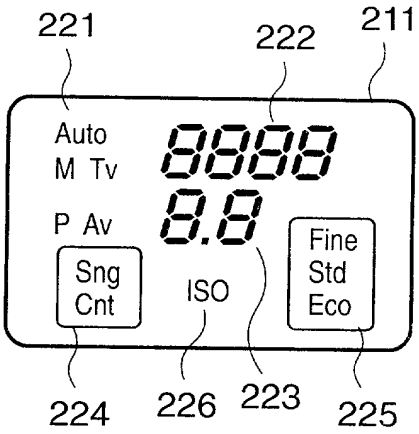


FIG. 8

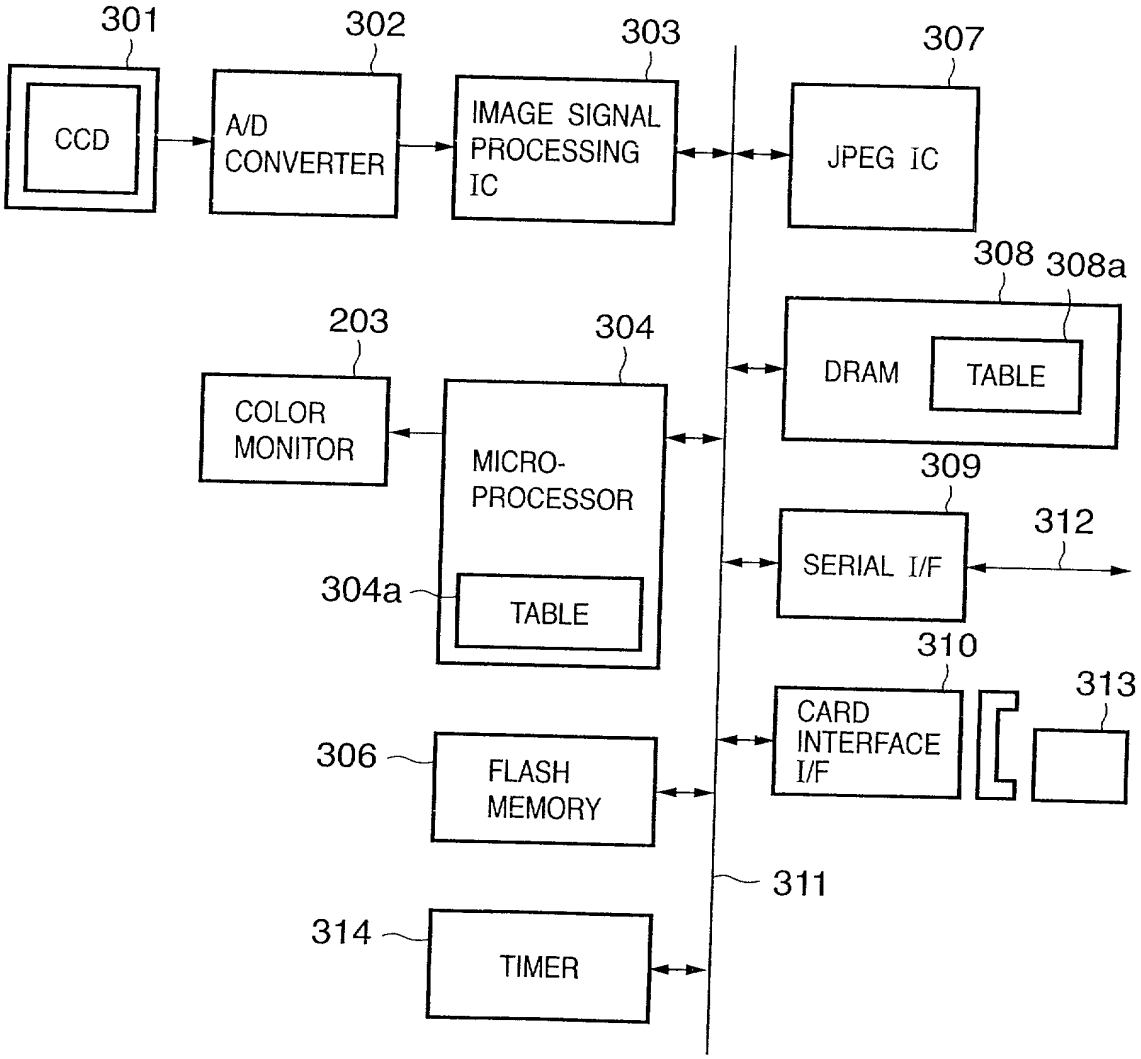

301
CCD
302
A/D CONVERTER
303
IMAGE SIGNAL PROCESSING IC
307
JPEG IC
308
308a
DRAM
TABLE
203
COLOR MONITOR
304
MICRO-PROCESSOR
304a
TABLE
309
SERIAL I/F
312
310
CARD INTERFACE I/F
313
306
FLASH MEMORY
311
314
TIMER

FIG. 9A

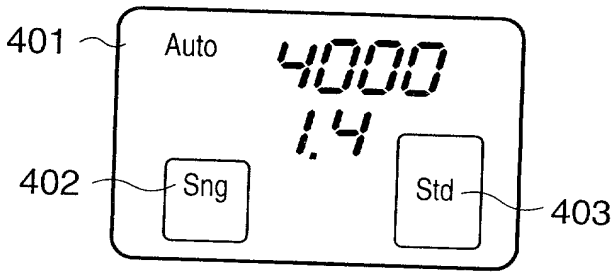


FIG. 9B

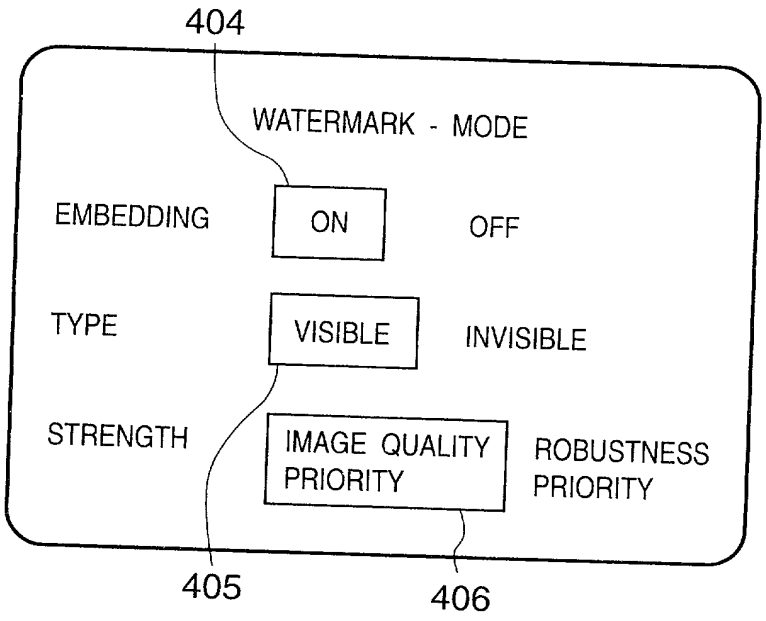


FIG. 9C

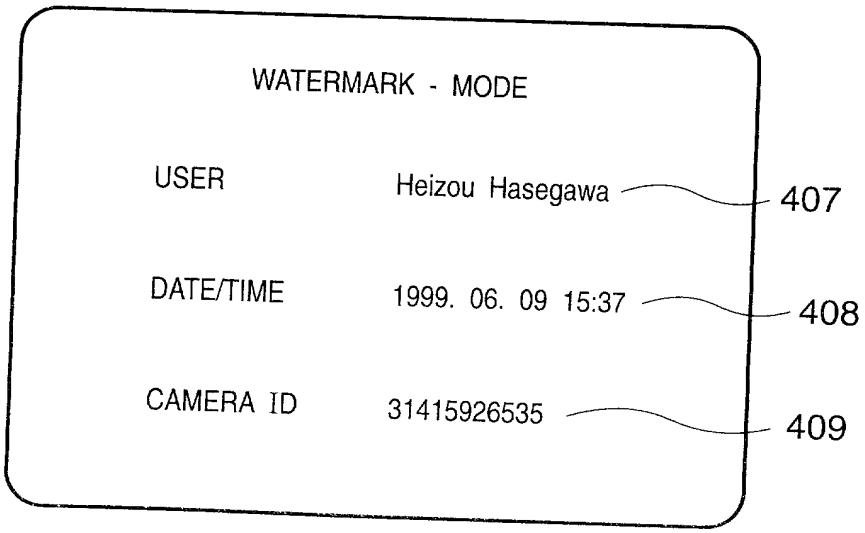


FIG. 10A

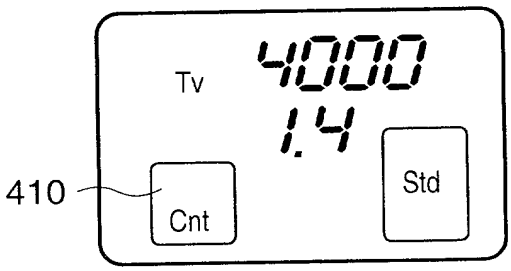


FIG. 10B

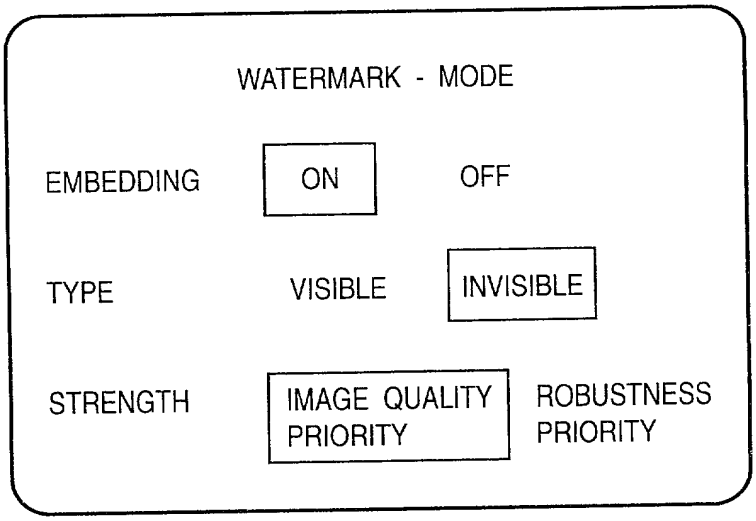


FIG. 10C

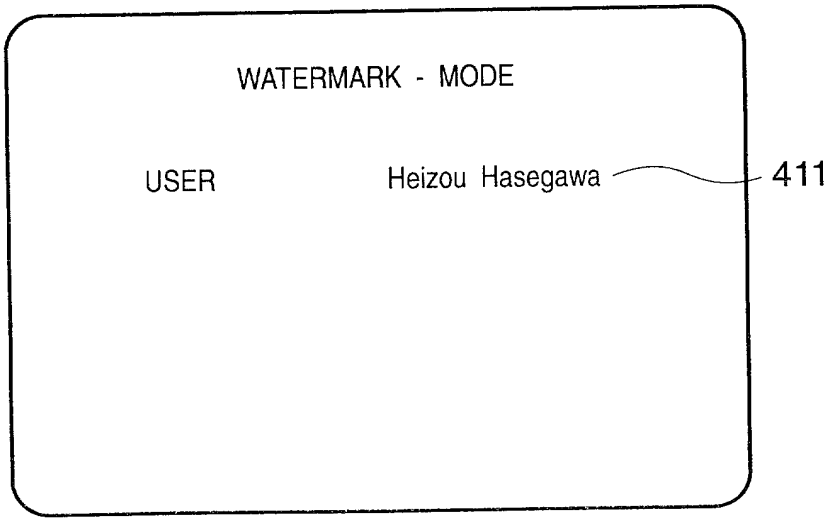


FIG. 11A

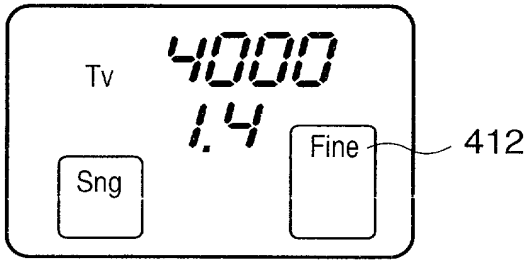


FIG. 11B

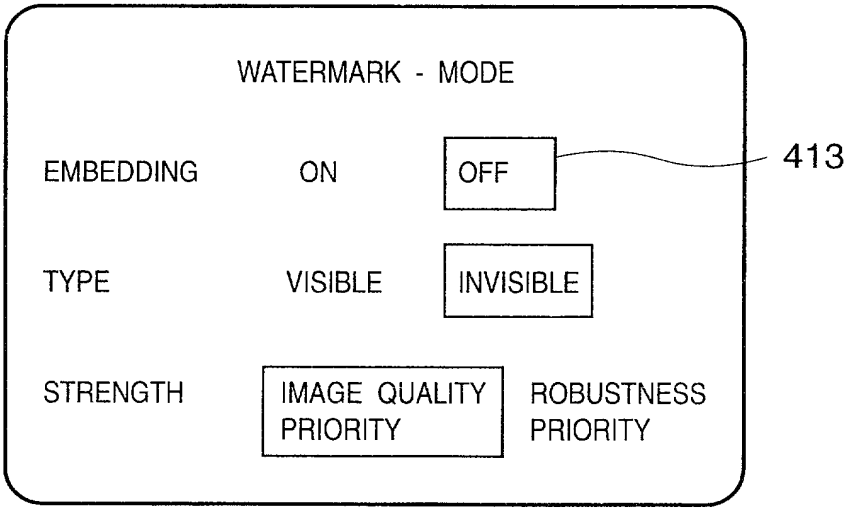


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FIG. 12A

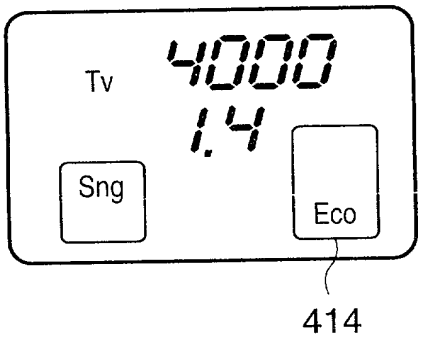

FIG. 12B

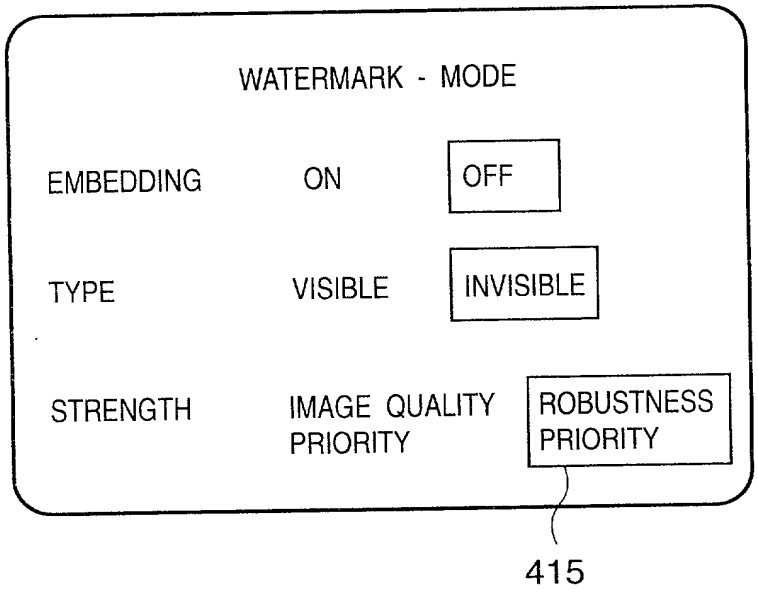

FIG. 13A

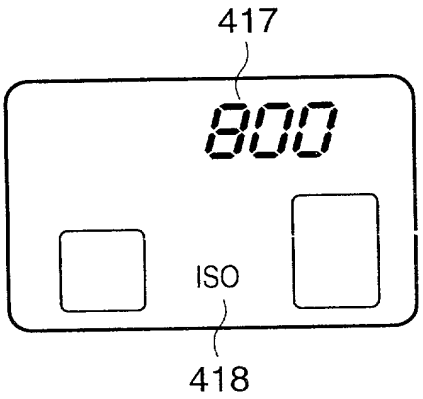

FIG. 13B

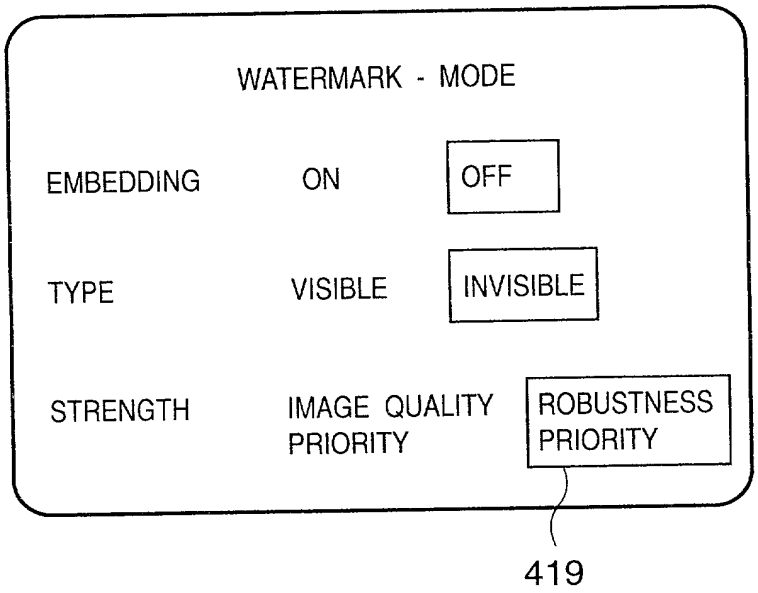

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FIG. 14

		EMBEDDING FUNCTION		TYPE		IMAGE QUALITY(STRENGTH) BASED ON WATERMARK		TO-BE-EMBEDDED DATA		
		ON	OFF	VISIBLE	INVISIBLE	IMAGE QUALITY PRIORITY	ROBUSTNESS PRIORITY	USER	+ DATE	+ CAMERA ID
IMAGE SENSING MODE	Auto	○		○		○		○	○	○
	P									
	Tv									
	Av									
	M									
DRIVE	Sng									
	Cnt							○		
IMAGE QUALITY (COMPRESSION) FOR STORAGE	Fine		○	—	—	—	—	—	—	—
	Std					○				
	Eco						○			
SENSITIVITY	LOW SENSITIVITY					○				
	HIGH SENSITIVITY						○			

FIG. 15

		IMAGE SENSING MODE					DRIVE		IMAGE QUALITY (COMPRESSION)			SENSITIVITY	
		Auto	P	Tv	Av	M	Sng	Cnt	Fine	Std	Eco	LOW SENSITIVITY	HIGH SENSITIVITY
EMBEDDING FUNCTION	ON												
	OFF												
TYPE	VISIBLE												
	INVISIBLE												
IMAGE QUALITY (STRENGTH)	IMAGE QUALITY PRIORITY								○			○	
	ROBUSTNESS PRIORITY												
TO-BE-EMBEDDED DATA	USER												
	+ DATE												
	+ CAMERA ID						○						

FIG. 16

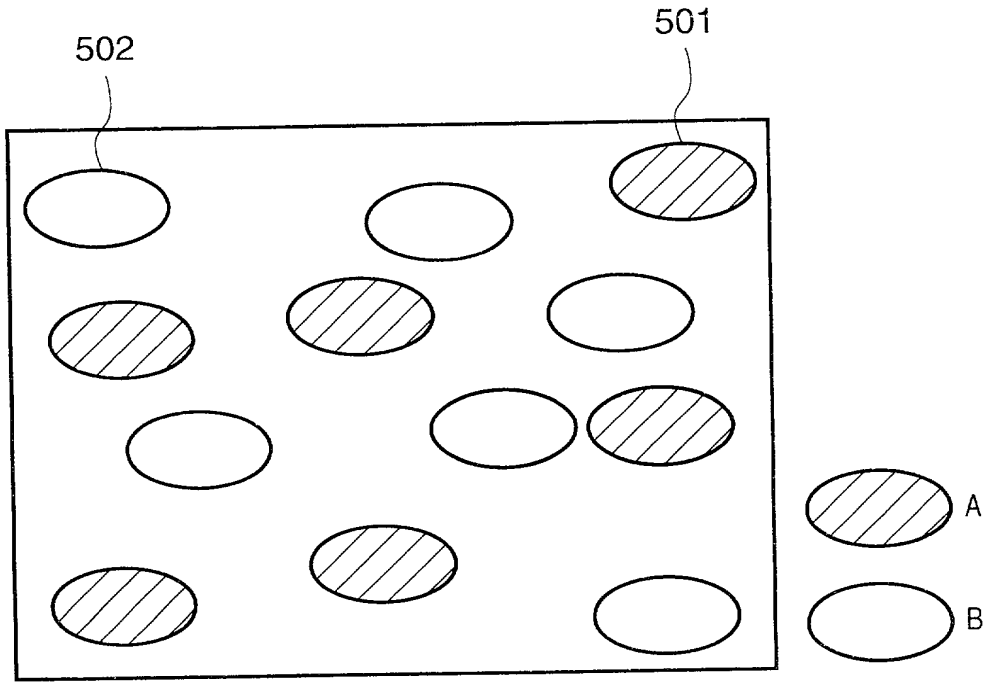
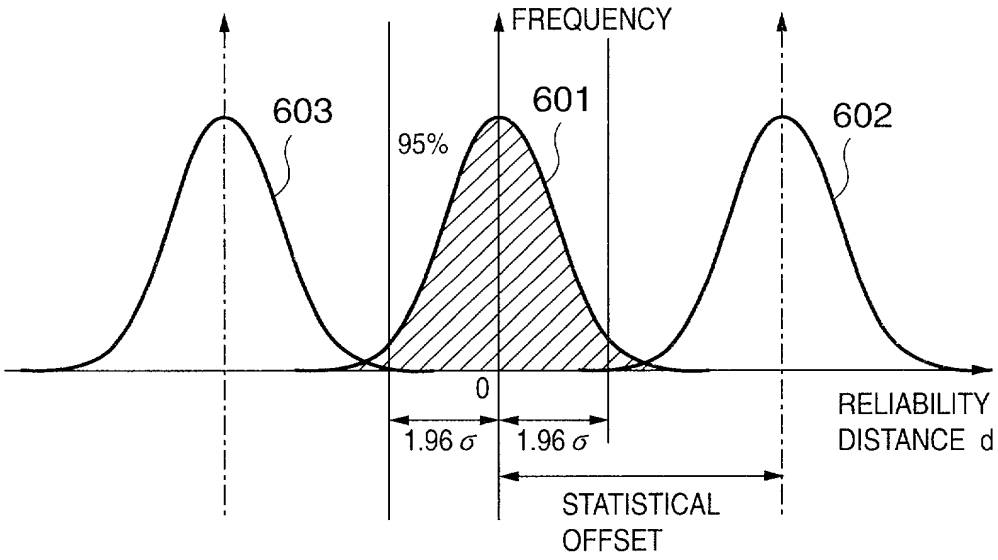


FIG. 17


FREQUENCY
603
601
602
95%
0
1.96 σ
1.96 σ
RELIABILITY
DISTANCE d
STATISTICAL
OFFSET

EP 1 237 358 A2

FIG. 18

308

WATERMARKING	ON	UNCHANGEABLE
VISIBLE / INVISIBLE	VISIBLE	UNCHANGEABLE
EMBEDDING LEVEL	HIGH IMAGE QUALITY	UNCHANGEABLE
USER NAME	ON	UNCHANGEABLE
IMAGE SENSING DATE	ON	UNCHANGEABLE
CAMERA ID	ON	UNCHANGEABLE

FIG. 19

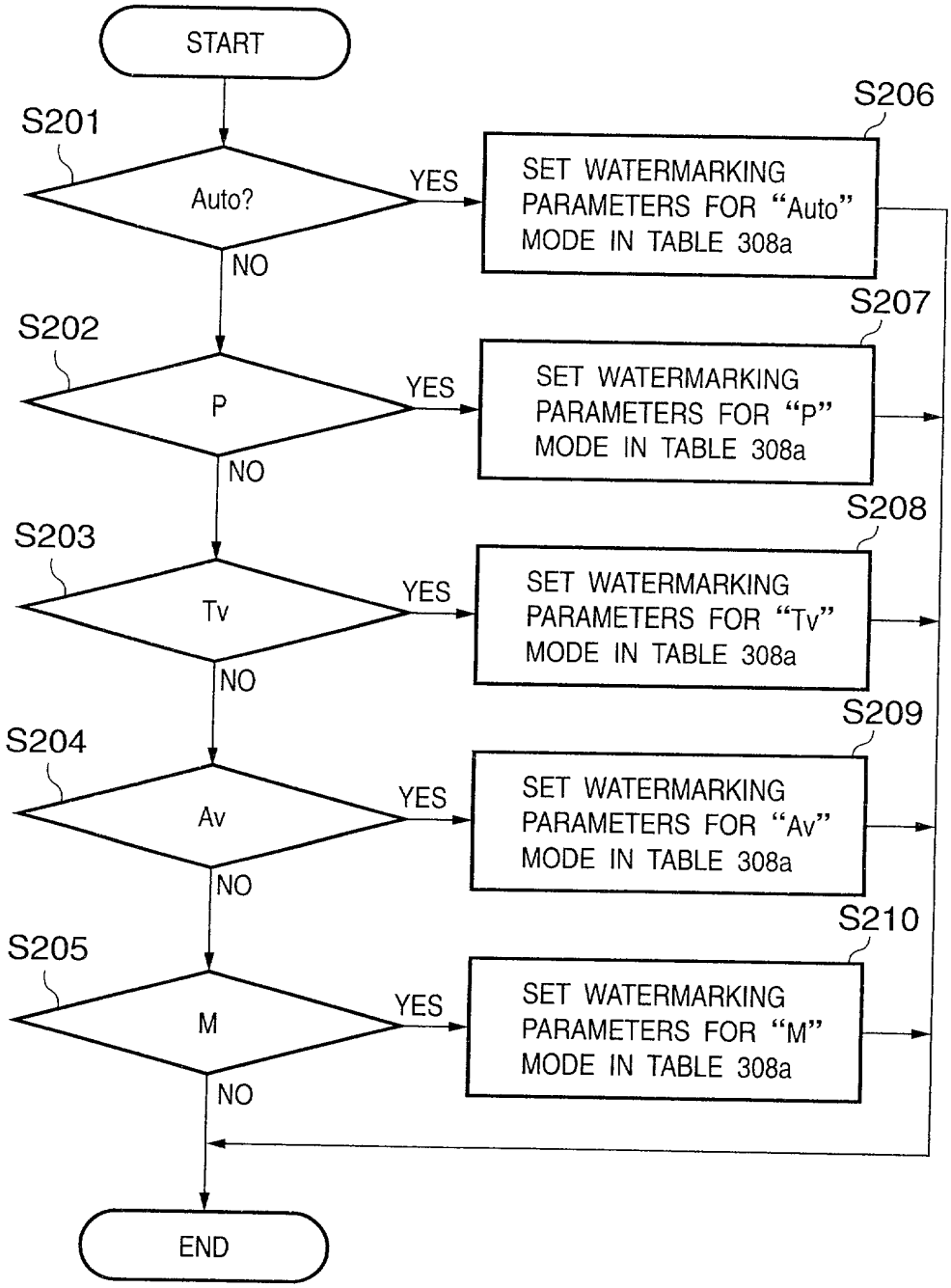

START
S201
Auto?
YES
NO
S206
SET WATERMARKING PARAMETERS FOR "Auto" MODE IN TABLE 308a
S202
P
YES
NO
S207
SET WATERMARKING PARAMETERS FOR "P" MODE IN TABLE 308a
S203
Tv
YES
NO
S208
SET WATERMARKING PARAMETERS FOR "Tv" MODE IN TABLE 308a
S204
Av
YES
NO
S209
SET WATERMARKING PARAMETERS FOR "Av" MODE IN TABLE 308a
S205
M
YES
NO
S210
SET WATERMARKING PARAMETERS FOR "M" MODE IN TABLE 308a
END

FIG. 20

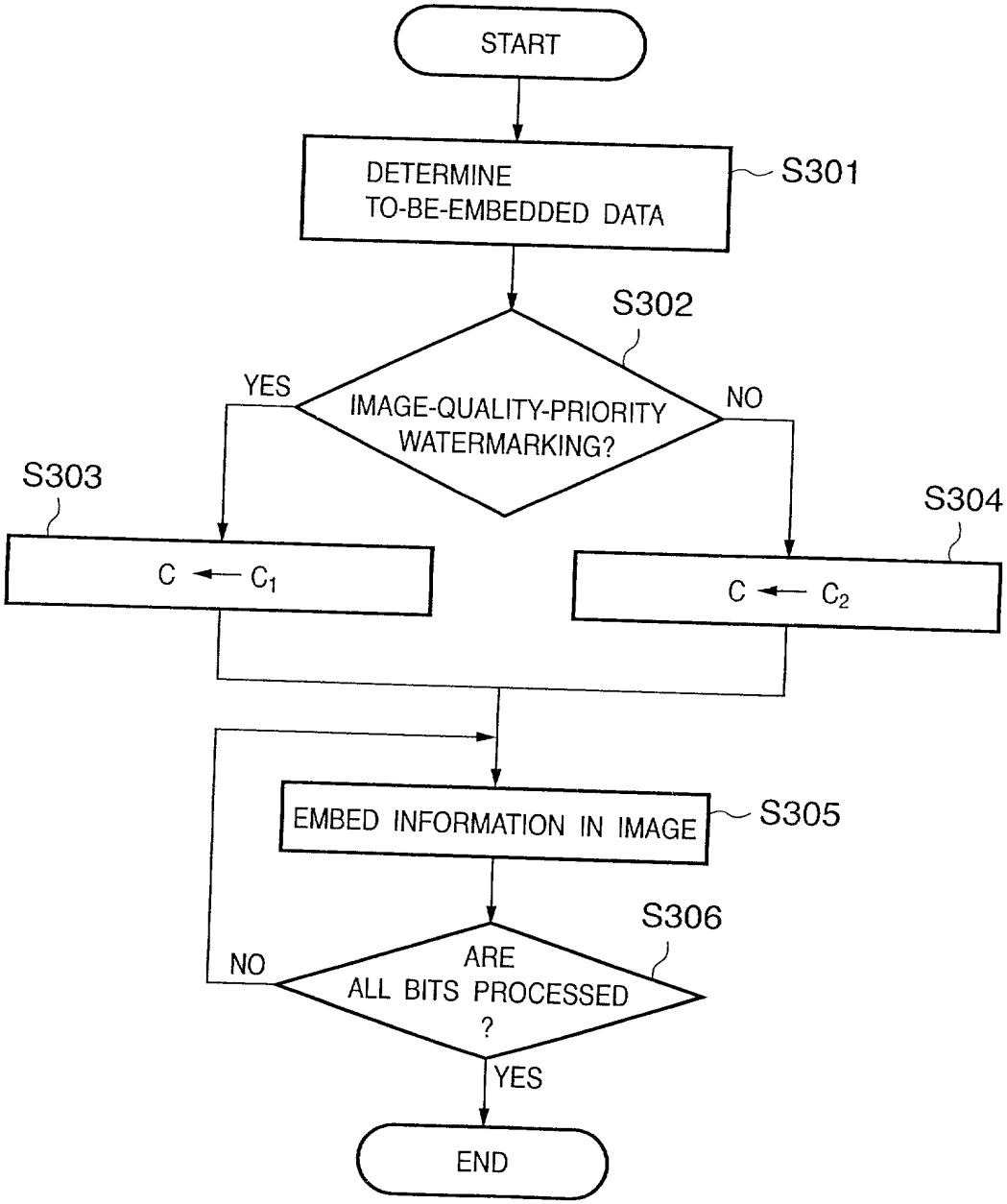
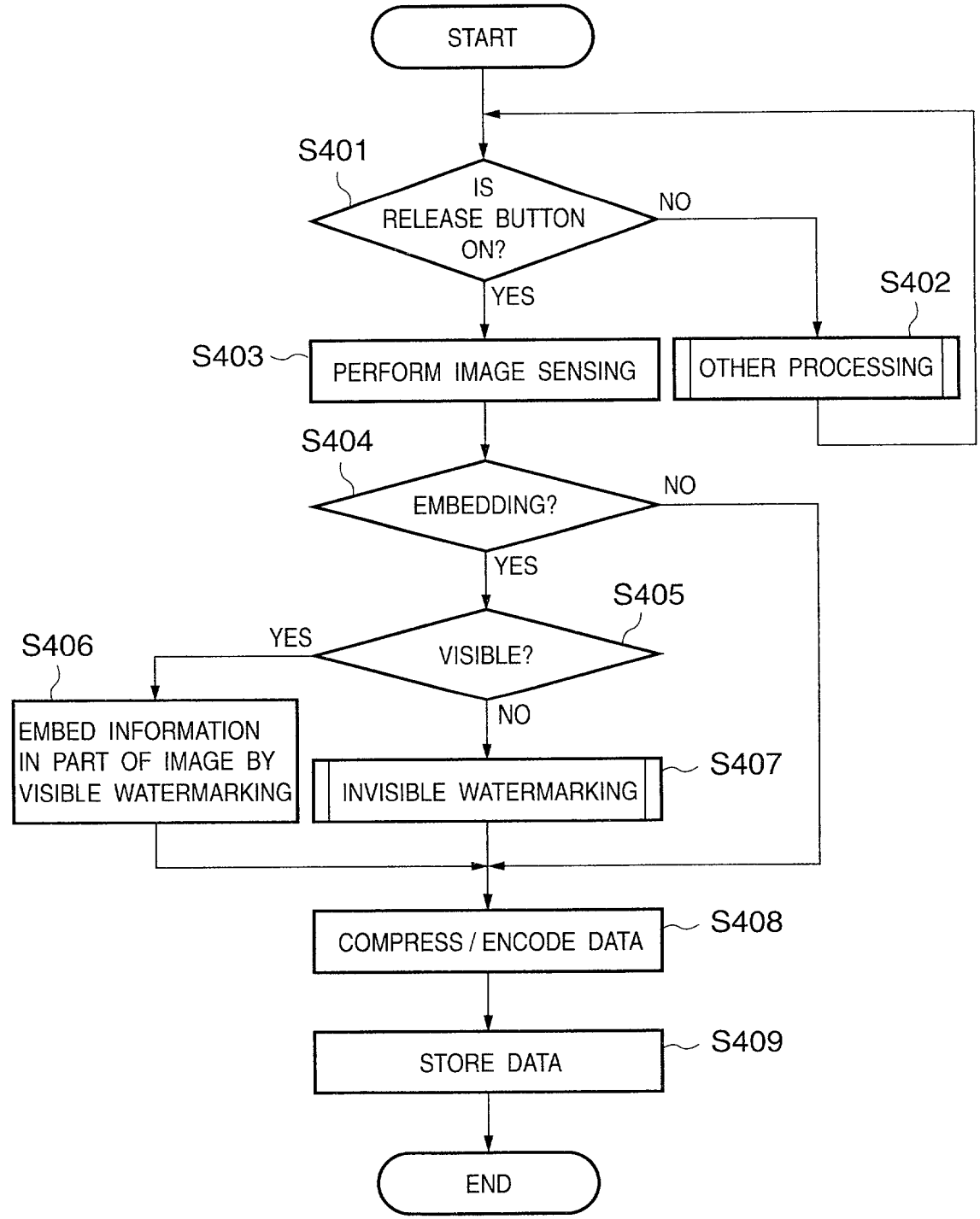

START
DETERMINE TO-BE-EMBEDDED DATA
S301
S302
IMAGE-QUALITY-PRIORITY WATERMARKING?
YES
NO
S303
C ← C1
S304
C ← C2
EMBED INFORMATION IN IMAGE
S305
S306
ARE ALL BITS PROCESSED ?
NO
YES
END

FIG. 21


START
S401
IS RELEASE BUTTON ON?
NO
YES
S402
OTHER PROCESSING
S403
PERFORM IMAGE SENSING
S404
EMBEDDING?
NO
YES
S405
VISIBLE?
YES
S406
EMBED INFORMATION IN PART OF IMAGE BY VISIBLE WATERMARKING
NO
INVISIBLE WATERMARKING
S407
COMPRESS / ENCODE DATA
S408
STORE DATA
S409
END